RHDM-1701

16.5" LCD Broadcast Monitor

Maintenance Manual

K5960059-00

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1 About the manual

1.1 Contents of the maintenance manual

This manual consists of the following chapters:

Chapter 1: About the manual

Chapter 2: Important notices, product safety precautions and package and storage

The chapter contains important notices and safety precautions providing essential juridical and technical information about the purchased product.

Chapter 3: About the product

Chapter 4: Board location

This chapter gives an overview of the location of the electronic boards within the unit.

Chapter 5: Hardware and software module overview

A hardware and software module overview plus a list of configuration possibilities are shown and listed in the chapter.

Chapter 6: Diagnostics

In case the unit does not behave normal, some general tips are listed in this chapter. By following the Fault Finding Tree, a service engineer will find, on an easy way, the faulty unit.

Chapter 7: Removal and reinstallation of electronic boards

If a faulty board is detected by means of the previous chapter, then it can be swapped following the procedures of this chapter.

Chapter 8: Interconnections

This chapter describes the internal connections between the different boards and modules of the unit.

Chapter 9: Adjustment procedures

After swapping a board, it might be necessary to perform some adjustments, if this is the case then these adjustments procedures are described here.

Chapter 10: Maintenance

This chapter contains the cleaning instructions of the LCD screen and the cover of the unit.

It also describes the function and the general operation of the Barco keypad as maintenance interface (if applicable).

An overview of preventive maintenance to be performed on regular bases is also given in this chapter.

Chapter 11: List of abbreviations

1.2 Change record

Revision	Date	Description
00	Aug-10	Initial release

1.3 Notation convention

Following notations are applicable to this manual and should be respected throughout the manual.

WARNING:

Warnings – presented in this manual, provide information, which if not adhered to, may result in personal injury or death.

CAUTION:

Cautions – presented in this manual, provide information, which if not adhered to, may result in damage to the equipment.

NOTE:

Notes – presented in this manual, provide information, which emphasize points, significant to understand and operate the unit.

IMPORTANT:

Important – presented in this manual, provide information, which is important to highlight.

2 Important notices, product safety precautions and package & storage

2.1 Read carefully

> **IMPORTANT:**
>
> Please read the important notices and safety precautions, mentioned in the following paragraphs, carefully. They provide essential juridical and technical information about the purchased product.

2.2 Important notice

2.2.1 Copyright

© Barco n.v., All rights reserved.

The information contained herein is Barco confidential information. No part of the information contained herein may be disclosed outside of the organization of the recipient, its sub-contractors, and customers in any form or by any means and/or stored in a database or retrieval system without the prior written consent of Barco.

2.2.2 Technical accuracy notice

Although every attempt has been made to achieve technical accuracy in this document, we assume no responsibility for errors that may be found. Our goal is to provide you with the most accurate and usable documentation possible; if you discover errors, please let us know.

2.2.3 Federal Communication Commission (FCC) notice

This equipment has been tested and found to comply with the limits of an FCC class (refer to the technical specifications of the specific unit for more details about the corresponding class). These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2.2.4 Warranty

During the warranty period, Barco n.v. will do all repairs free of charge (material and labor). The faulty parts or units have to be shipped freight prepaid to a Barco n.v. regional service center. Barco n.v. will pay the freight charges when the repaired parts are shipped back to the customer's site.
Damage of equipment due to improper use or negligence of the safety

precautions incorporated in this manual are not covered by this warranty.

The warranty does not include the following:

- *Any hardware or software item procured from a source other than Barco n.v. or their official agent or distributor and integrated by Customer or a third party into Barco n.v. supplied equipment.*

- *Any host or system configuration not explicitly supported by Barco n.v..*

- *Consumables such as projector lamps, dust filters, ...*

- *All software installed on the system, whether they are acquired from Barco n.v. or a third party. An exception is made for software delivered by Barco n.v. that would prove to be a cause for the malfunctioning of the hardware covered under this Agreement.*

- *If any payment remains outstanding from the Purchaser to the Seller.*

- *Normal wear and tear, use under circumstances exceeding specifications, abuse, unauthorized repair or alteration, lack of proper maintenance.*

- *In the particular case of LCD displays, to the case of image retention phenomena (shadows, dark lines and other image artifacts), that may result from a usage outside of the specification.*

- *Any failures resulting from an accident, negligence (such as but not limited to removing or deleting system files & licensed software product files), misuse, circuit failure or any change, damage due to fire, water, thunder or lightning, power failure or fluctuation, disruption of communication lines or due to force majeure, or any reason foreign to the equipment.*

- *Any specific services or procedures, asked for by the Customer, related to verification of repaired equipment.*

- *If several failures occur which are excluded from warranty due to circumstances such as fire and if Barco n.v.'s understanding that these circumstances may result in damage to other hardware under agreement, then Barco n.v. is entitled to terminate the contract. No fees will be paid back by Barco n.v. in this case. Inspection of equipment will be required prior to the continuation of this Agreement; the same terms and conditions as for the inspection prior to the contract apply.*

2.2.5   Trademarks

Brand and product names mentioned in this manual may be trademarks, registered trademarks or copyrights of their respective holders. All brand and product names mentioned in this manual serve as comments or examples and are not to be understood as advertising for the products or their manufactures.

2.2.6   Open source license

This product contains software components released under an Open Source license. A copy of the source code is available on request by contacting your sales representative.

See appendix A for details.

2.3   Safety precautions

2.3.1   Service safety precautions

WARNING:

Electric shock or fire hazard can be caused if critical components are replaced by non-conforming components. These components are marked in this guide by a ⚠ sign. **Replace with conforming types only!**

2.3.2   Product safety notice

WARNING:

Many electrical and mechanical parts in display units have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts that have these special safety characteristics are identified in this data and its supplements and bulletins. Electrical components having such features are identified by ⚠ or * on the schematics and on the parts lists in this data and its supplements and bulletins. The use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part shown in the parts lists in this data and its supplements and bulletins, may create shock or fire.

2.3.3   Earthing

WARNING:

The display unit must be earthed correctly. Verify that the power cable is plugged into a standard 3-pin power outlet which is effectively earthed. When using extension cords, make sure that they contain a grounded connection. If in doubt, contact a qualified electrician. Ignoring this warning may lead to personal injury or death.

2.3.4   Electro Static Discharge (ESD) notice

CAUTION:
The unit contains ESD sensitive subassemblies. The equipment has been built in accordance with the Barco ESD protection procedure. **Use an earth strap during service interventions!**

2.3.5   Electrical warnings and cautions

- Do not power the unit with other input sources as specified in the technical specifications.
- Always power-down the unit before disconnecting the power cable.
- Unplug the display unit from the power source when not in use.

IMPORTANT:

Immediately unplug if:

- the power supply cord is damaged.
- the unit has been dropped or the cabinet is damaged.
- the unit does not operate normally by following the operation instructions.

WARNING:

Do not remove the cover without authorization. Removal of the cover by non-qualified personnel can cause personal injury.

2.3.6 Environmental cautions

- Do not use the display unit in a dusty or damp room.
- Do not submit the display unit to heavy shocks and/or vibrations.
- Do not cover the display unit while in operation to avoid overheating.
- Do not expose to direct sunlight.
- Do not use the display at extreme limits of temperature and humidity range. Storage and operating limits are specified in the technical specifications of the unit.

2.3.7 Requirement for dusty environments

The room in which the display unit is installed and operational must be dust-free. The room must comply with a dust class of 8 or better according to ISO14644-1. If the room in which the display unit is installed does not comply with the dust class stated above, please contact Barco to discuss possibilities to protect the display unit against dust.

NOTE:

All construction, reconstruction, decoration activities must be completed before the installation and operation of the product.

2.3.8 LCD screen

- Do not apply pressure on the surface of the screen. If 'waves' are visible on the screen below the pressing object (e.g. finger), the pressure is already too high and the LCD may already break under these circumstances.
- Do not hit the LCD screen with hard objects.
- Do not rub the LCD screen with rough materials.
- Do not touch the LCD screen with hard materials. Hard materials can cause scratches on the surface of the LCD screen. Examples of hard material are: fingernails, pencils, pens and styluses, wooden, plastic or metal objects.
- While moving the display unit manually, hold the LCD screen away from your body to avoid scratching the LCD screen.

- Do not paste or stick objects with glues and/or adhesive tapes on the LCD screen.
- Wipe off water droplets or oil immediately. Ignoring this precaution could lead to staining and/or discoloration of the LCD screen.
- Do not expose the LCD screen to direct sunlight.

2.3.9 Cover

- Do not place objects on the cover.
- Do not spill fluids over the cover or the LCD screen.
- Do not push objects into ventilation openings of the display unit.

2.3.10 Hazardous materials

WARNING:

The LCD panel is composed of multiple layers of glass and protective glass with a small amount of liquid in between. Rough handling or dropping can cause the LCD panel to break. If any part of the skin or body comes in direct contact with the liquid, immediately wash the affected areas with plenty of water for at least 15 minutes. If any symptoms are present after washing, get medical care.

2.4 Package and storage

2.4.1 General

A safe transport of the units can only be guaranteed if the original undamaged package is used for shipping. Handle with care when transporting.

Keep your original packaging. It is designed for this unit and is the ideal protection during transportation.

2.4.2 Procedure in case of damages

All shipments should be opened and inspected for concealed damage or pilferage as soon as possible after the arrival at destination. The shipping cartons should be retained for the surveyor's inspection and full and accurate reserves must be made by a letter or a fax message.

Depending upon the used means of transport, the written protest is subject to different time-rules:

- by sea: the protest has to be issued against the captain and/or ship within 3 days of the delivery of the goods.
- by road: the protest has to be issued against the last road-carrier within 7 days after delivery of the goods.
- by air: the protest has to be issued against the air-carrier within 14 days after delivery of the goods.

In all cases, a claim or potential claim should be reported as soon as possible whether or not full documentation is immediately available.

After completion of all required steps, the claim should normally be finalized within one month. For more information about the claims handling procedure, contact Barco n.v.

2.4.3 Storage

It is best to store the display unit in its original packaging in a room that does not exceed the storage conditions mentioned in the technical specification.

2.4.4 Electrolytic capacitors

The display unit needs to be powered on for a period of 24 hours at least once every 2 years to allow internal electrolytic capacitors to be reformed. Failure to do so may lead to compromised reliability.

2.4.5 Packaging

- Packaging corresponds to standards for international transport by air / sea / ground.
- Dimensions:
  - ✓ Height: 550 mm
  - ✓ Width: 675 mm
  - ✓ Depth: 400 mm
- An optional flight case is available for flexible demo purposes: contact Barco for more details.

2.4.6 Repack instructions

⚠️ **CAUTION:**
To repack the display unit, please use the original packaging material.

- Place the box with the backside on a stable and flat surface.
- Make sure the rack brackets are mounted to the display unit and the stand, if there was one used, is removed.
- Place the display unit in the plastic bag and seal the plastic bag.

- Place the 2 protective covers one on the left side of the display and one on the right side of the display. Note that the left and right side are slightly dif-

ferent and should be used correctly.
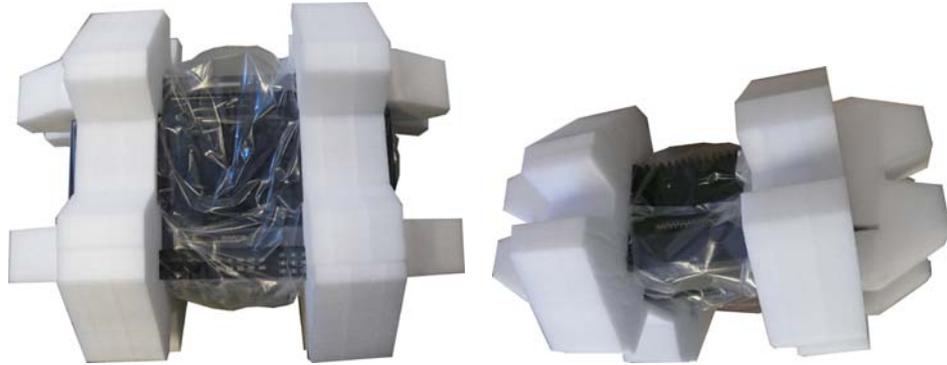
- Place the display unit gently in the box. The bottom side of the display facing down. Include all original items provided with the display unit, including cables, User manual and guiding sheets.

- Seal the box with tape.

2.5   Contact information

Belgium

Email: support.smd@barco.com

Phone: +32 56 262 350

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United States

Email: Helpdesk.BCDUSA@barco.com

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Fax: + 1 678 475 8124

Web sites

Public Web site: http://www.barco.com

Partner Web site: http://my.barco.com

3   About the product

The RHDM-1701 is a reliable grade-1 reference monitor for color critical applications in the broadcast and post-production markets, such as:

- camera control

- program and distribution monitoring

- signal QA (Quality Assurance)

- technical room

- color grading

- DI (Digital Intermediate)

The RHDM-1701 reference monitor brings value of trusted reference colors, no calibration maintenance for a long period, and image quality comparable to CRT.

On top of that, the user-friendly interface and ease of use are unparalleled in similar LCD monitors.

On the feature level, the color accuracy and stability with time and temperature, perfect grey scale representation, deep and correct blacks, motion handling with scanning backlights and a myriad of other features give large benefits to professionals active in these markets.

The Key features of the display unit are:

LCD panel

- 16.5″ (41,9cm) diagonal

- 1920x1080

- 10 bit panel

- Typical contrast 1000:1

- Barco guarantees the delivery of a RHDM-1701 monitor equipped with an LCD panel selected zero dot defects at sparkle mode. Sparkle mode is when the brightness of a dot is more than 16% at black.

Optical properties

- Wide gamut LED backlight

Processing of input signals

- 48 bit color processing (16 bit per color)

- 96-120 Hz native LCD driving

- Genlock and frame sync

- Quantified latency

- Scanning backlight functionality

Calibration and stability

- Compliant with following color standards:

  - ✓ EBU 3213
  - ✓ SMPTE C
  - ✓ ITU BT.709
  - ✓ xvYCC
  - ✓ sRGB
  - ✓ Adobe

- ✓ DCI

- Selection of different opto-electric transfer functions ('gamma')
  - ✓ Rec.709
  - ✓ xvYCC
  - ✓ Pure gamma
  - ✓ Extended gamma
  - ✓ sRGB
  - ✓ SMPTE 240M

- Factory cross-talk calibration

- Thermal sensor circuit for LED stabilization with temperature

- Embedded spectrometer for overall color stabilization over time

- Embedded special sensors for LED uniformity and color stabilization over time

- Front sensor for stabilization of LCD

Modular input configuration (4 slots)

- Slot 1 - 1 SDI input board (standard)

- Slot 2 – 1 SDI input board (optional)

- Slot 3 – future option (DVI)

- Slot 4 – future option (DVI)

SDI module specifications

- Possible inputs:
  - ✓ 2 x SDSDI
  - ✓ 2 x HDSDI
  - ✓ 2 x 3Gb/s (option)
  - ✓ Combination of 2 signals out of: SDSDI, HDSDI or 3Gb/s (option)
  - ✓ 1 Dual Link (option)

- Outputs: 2 loop-through outputs

Control

- Control panel with main functions and hot keys

- Ethernet interface with web server

- RS485 serial and parallel control of Tally/UMD

- USB: host, peripheral and support of mass storage devices, mouse, etc…

Feature packs and options

- The RHDM-1701 comes in different flavors. Depending on the specific applications that are targeted by the user, different feature packs can be selected. Depending on the feature pack, additional options can be available.

- Broadcast – RHDM-1701/B: standard feature pack
  - ✓ Accepts SD and HD-SDI timings (2 inputs with loop-through outputs)
  - ✓ Selectable color space (EBU, SMPTE C, Rec.709 and Native), color temperature and gamma
  - ✓ Configurable aspect ratio and safe area markers
  - ✓ Standard controls (picture, background, saturation, hue, color channel selection, monochrome, input selection, aspect ratio and picture size, interlace mode)

- ✓ No cooling fans

- Post production – RHDM-1701/P has all features of the B version plus:
    - ✓ Custom R, G, B primaries (in x,y)
    - ✓ Accepts Dual Link HD-SDI timings
    - ✓ Accepts 3Gb/s SDI timings
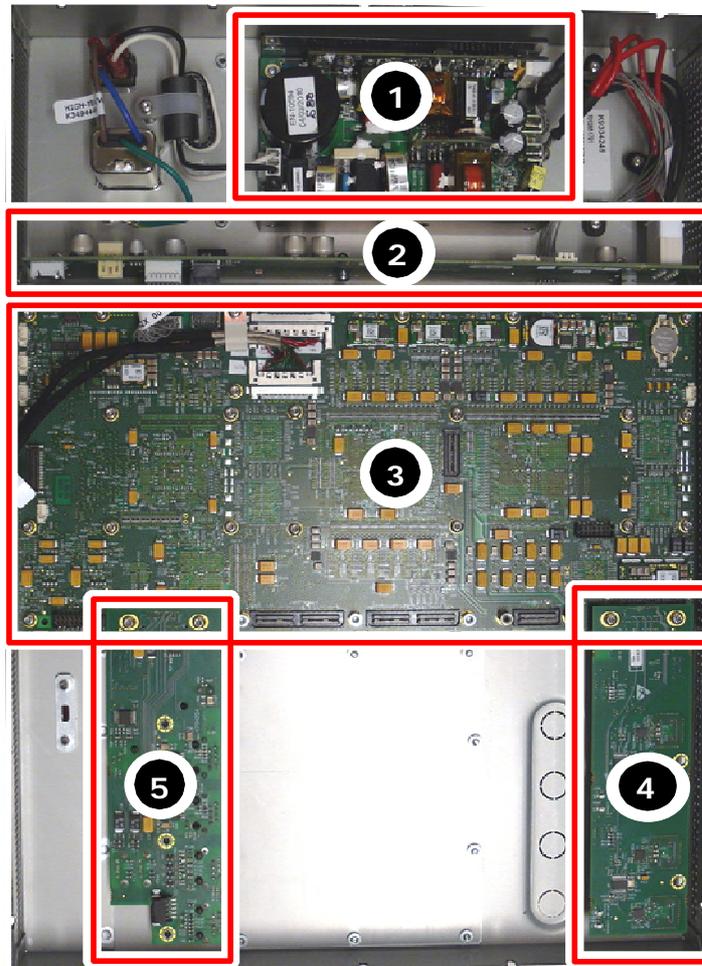   - ✓ No cooling fans

4 Board location

4.1 Front cover
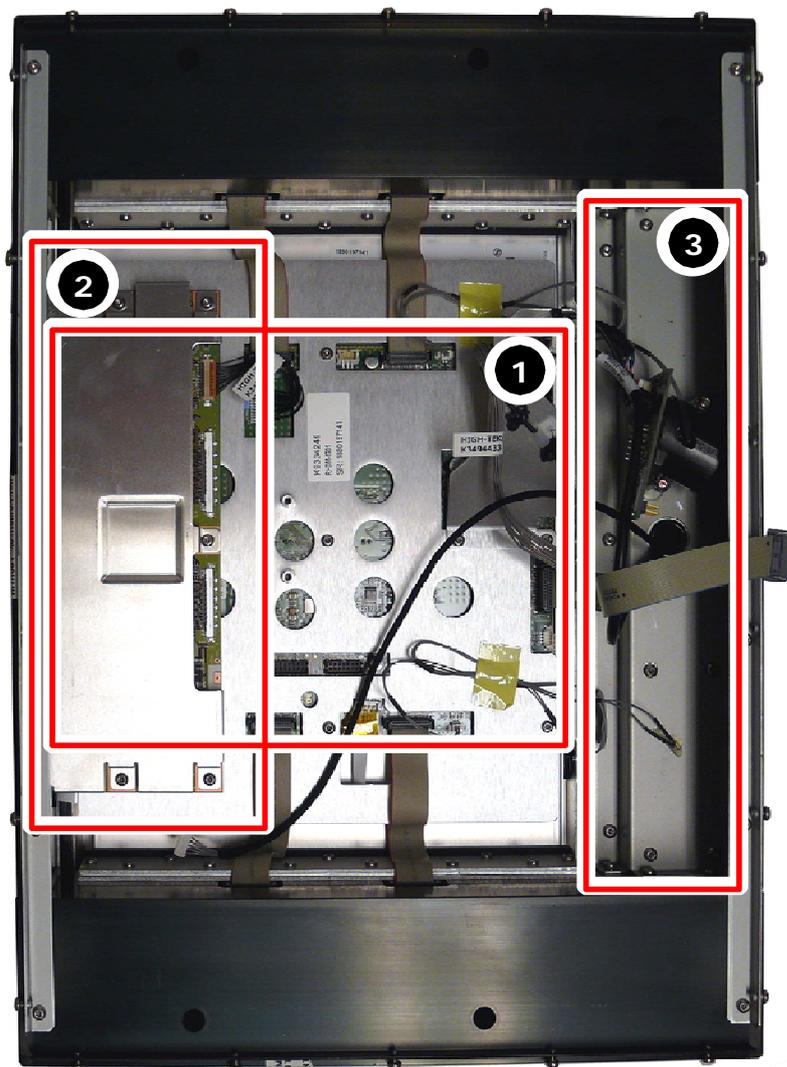
1	LED driver board
2	Panel driver board
3	Control box

Figure 1: Front cover – module overview

4.2   Back cover

1	Power supply
2	Power Interface Board
3	Iris board
4	HDSDI input board
5	Communication board

Figure 2: Back cover – module overview

5 Hardware & software module overview

5.1 Hardware tree
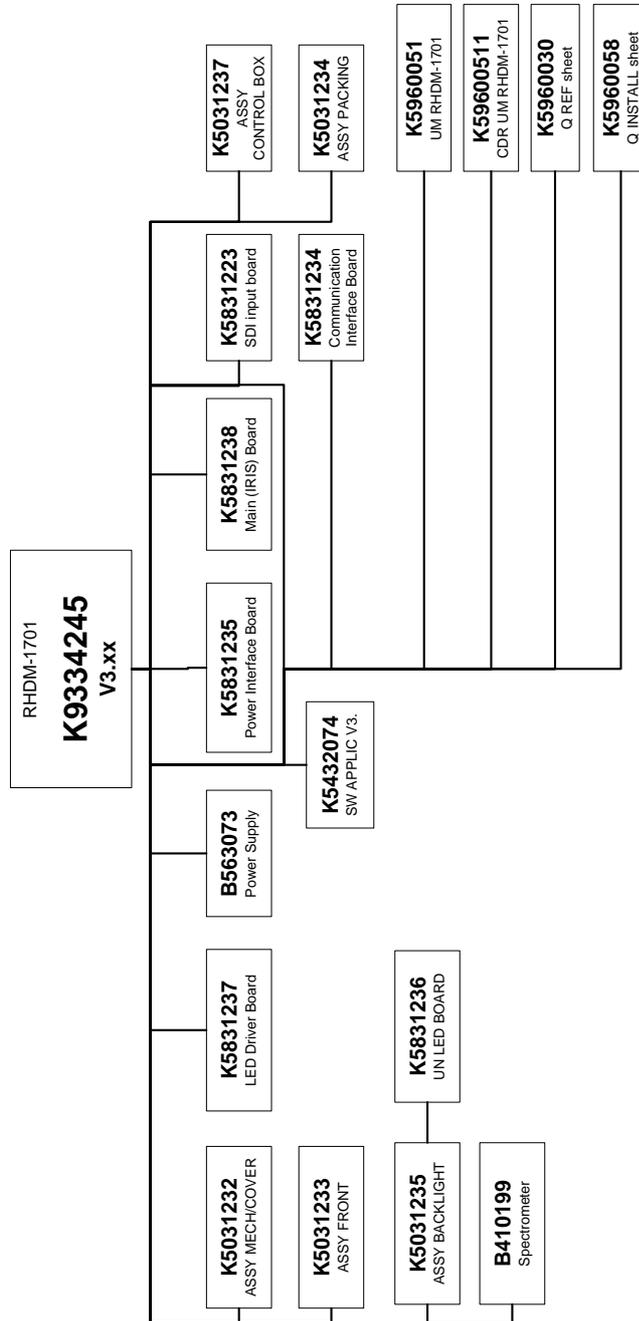
Figure 3: Hardware tree RHDM-1701

The hardware tree gives a schematic overview of all parts which are present in the RHDM-1701. Each type of display unit and electronic board receives a unique Barco number (K9334245).

5.2   Software tree
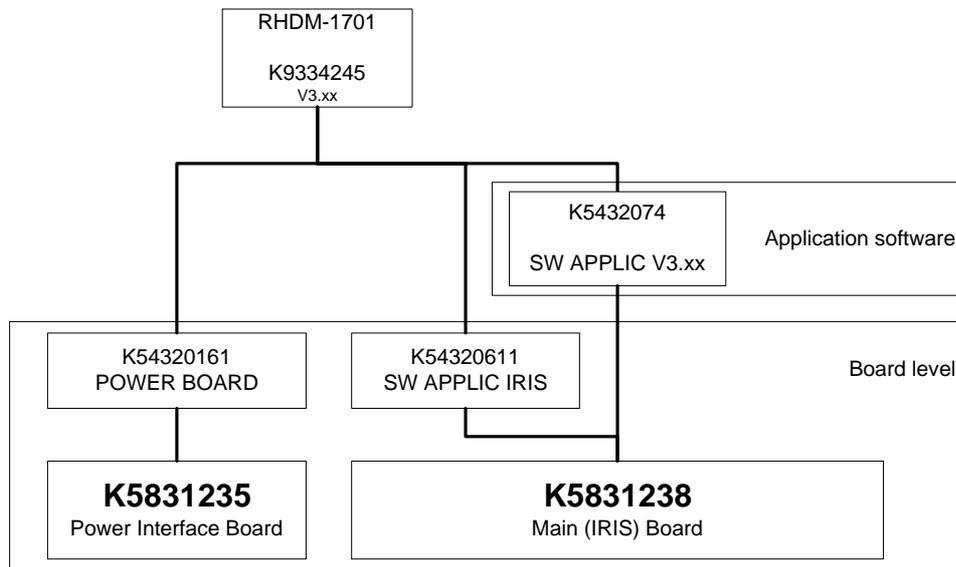
Figure 4: Software tree RHDM-1701

The only part of the software which can be updated at a service center is the Application Software. The instructions to update the main software is described in the user manual.

6 Diagnostics

6.1 Fault finding procedure

If you detect a problem with your configuration, please check the items listed in the user manual first.

In case of malfunction it is important to follow a certain troubleshooting procedure. Some of the steps in this procedure may seem obvious. Nevertheless, they are worthwhile checking. As a malfunction on one board (module) can influence the behavior of other boards (modules), it might be necessary to replace the same board (module) twice in the same troubleshooting procedure.

6.2 Start here

Check the fault finding trees as presented in the User manual (included below). If the fault finding trees of the User manual do not solve the problem, check the following items listed in this diagnostics chapter:

- Check if the right connections are present: See the section "Connections"

- Check if the issue is related to one of the following cases:

  ✓ In case the monitor power LED stays off, or there is no image even if the power LED is green.: See the section "Power diagnostics"
  ✓ In case the monitor is switched on, but nothing is displayed on the screen: See the section "Light diagnostics"
  ✓ In case the monitor keeps showing the no valid sync message: See the section "Image diagnostics"
  ✓ In case there is no communication with the monitor, and you are sure there are no network or IP address issues: See the section "Communication diagnostics"
  ✓ In case color is not correct or color is unstable: See the section "Color diagnostics"
  ✓ To verify if the IRIS board is defect, see the section "IRIS board diagnostics"

6.3 Fault finding trees User Manual

6.3.1 Description fault finding trees

When the display unit is not working properly or the operation instructions do not solve the problem, the troubleshooting may allow the user to identify the source of the problem.

The fault finding trees are divided into three structures. They should be checked according to the problem observed by the user:

- "No power" fault finding tree: The display unit does not seem to be powered. No LEDs are burning and nothing is observed on the screen.

- "Nothing observed on the screen" fault finding tree: The display unit is powered but no image is shown on the screen.

- "Verify input signal" fault finding tree: The display unit works correctly, but the applied input signal is not recognized or not displayed on the screen.

- Image displayed on the screen is distorted, shows bands or stripes. In this case something is wrong with the display unit. Contact Barco or your sales representative.
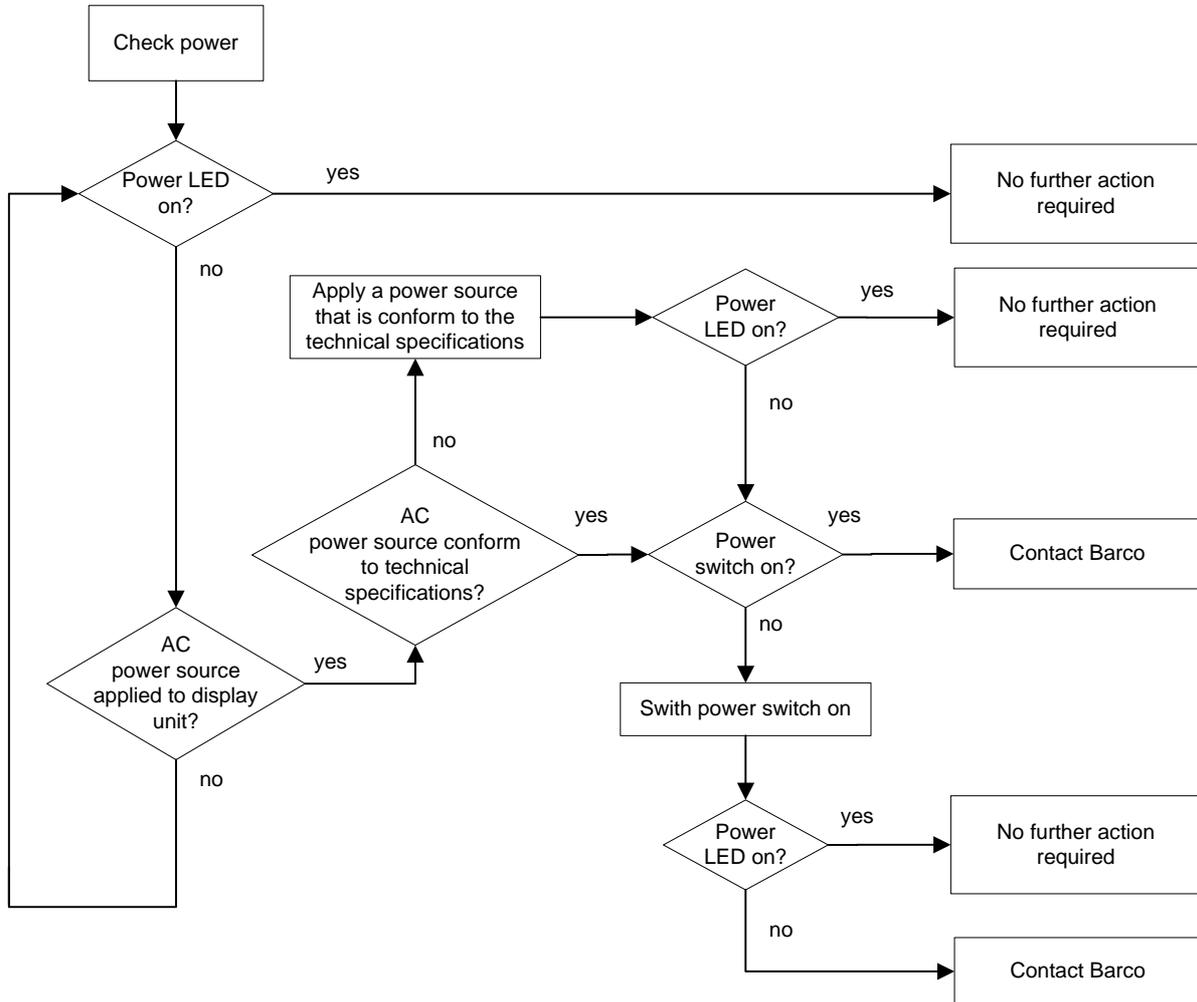
6.3.2 "No power" fault finding tree

Figure 5: "No power" fault finding tree

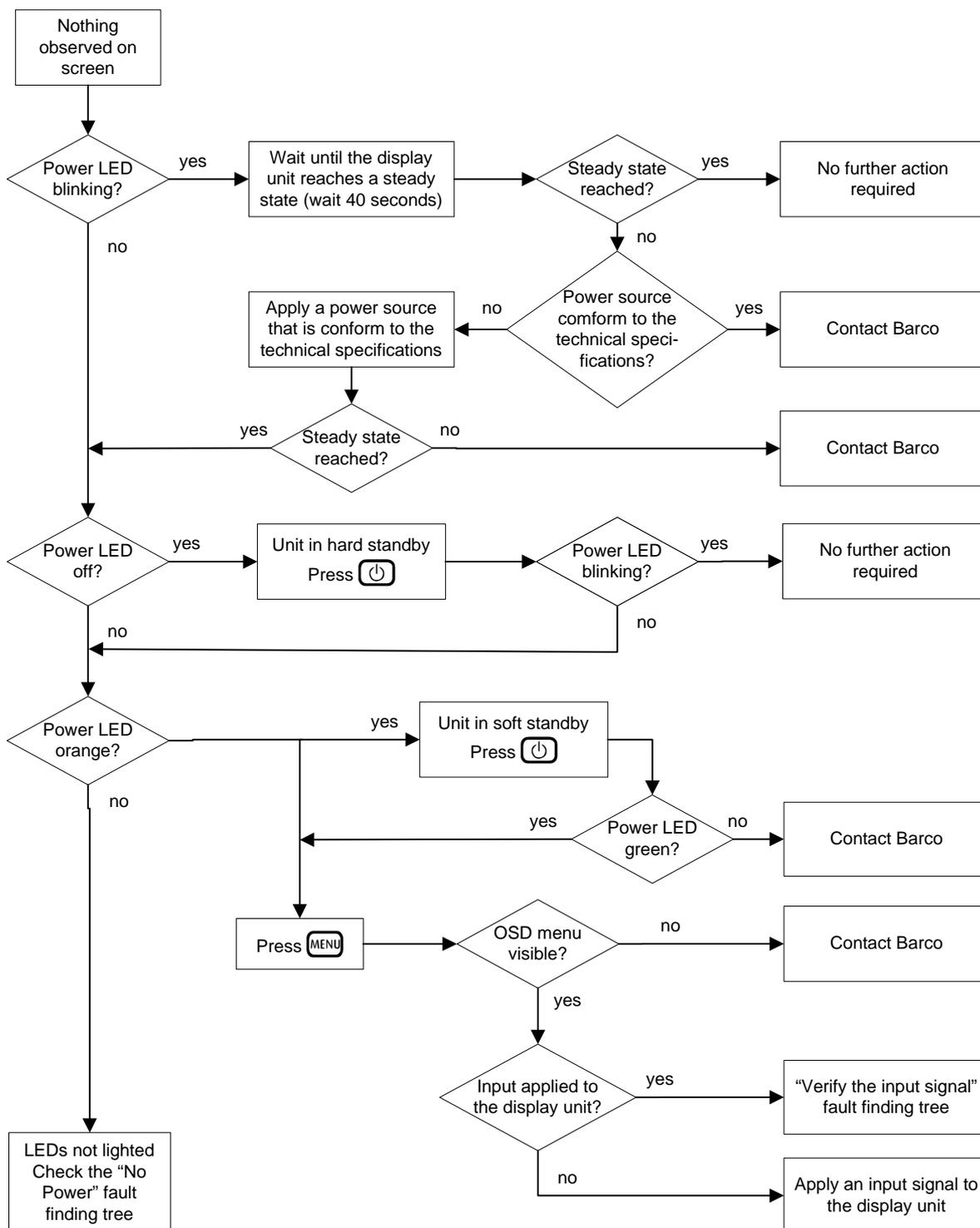## 6.3.3 "Nothing observed on the screen" fault finding tree

Figure 6: "Nothing observed on the screen" fault finding tree
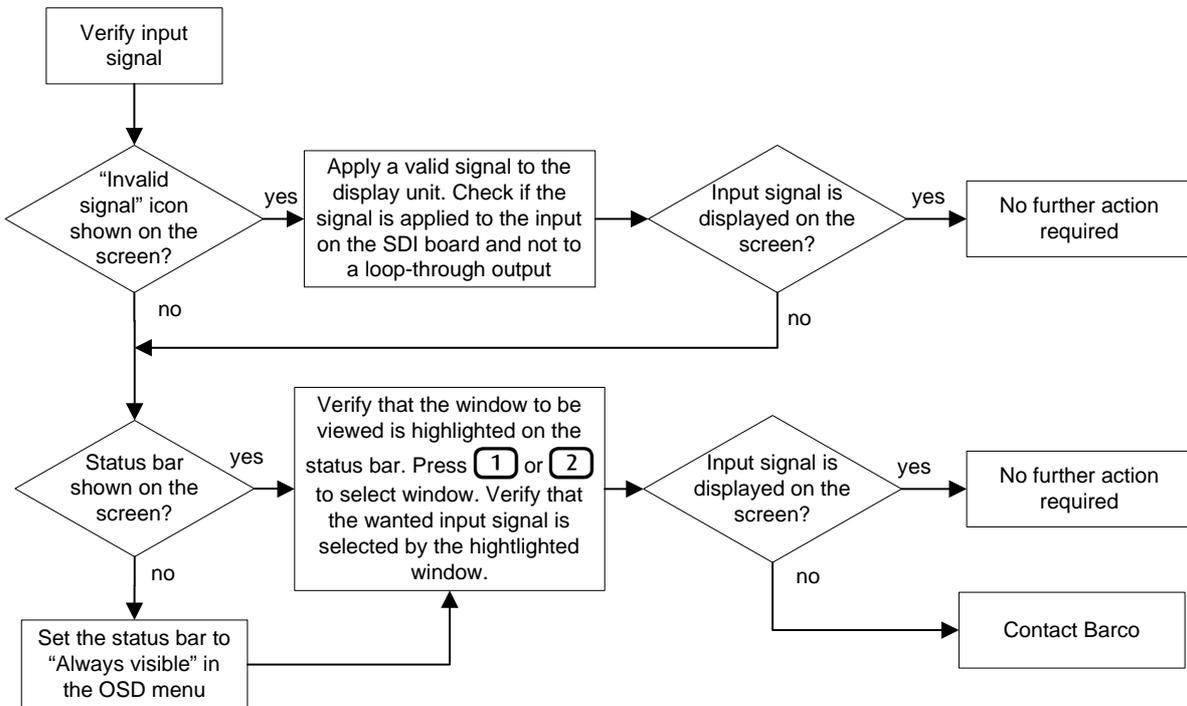
6.3.4 "Verify input signal" fault finding tree

Figure 7: "Verify input signal" fault finding tree

6.4 Connections

Check if the following connections are present:

- 110V/220V power AC supply
- Input source cable
- LAN Network connection

6.5 Power diagnostics

In case the display unit power LED stays off, or there is no image even if the power LED is green:

- Prepare the display unit for diagnostics

  - ✓ Remove or switch off power connection to the display unit
  - ✓ Remove back cover as described in "Removal and reinstallation back cover"
  - ✓ Do not disconnect any cables inside the display unit
  - ✓ Check all connections to and from the PIB as listed in "Removal and reinstallation of the power interface board (PIB)"
  - ✓ Apply the power connection to the display unit or switch on the power of the display unit

- AC power supply only:

  - ✓ Check if LEDs D16 and D17 are on.

✓ If both LEDs D16 and D17 are off, replace PIB as described in "Removal and reinstallation of the power interface board (PIB)"

• Power supply and PIB are working, but still no image is observed on the screen: See "Light diagnostics"

6.6   IRIS board diagnostics
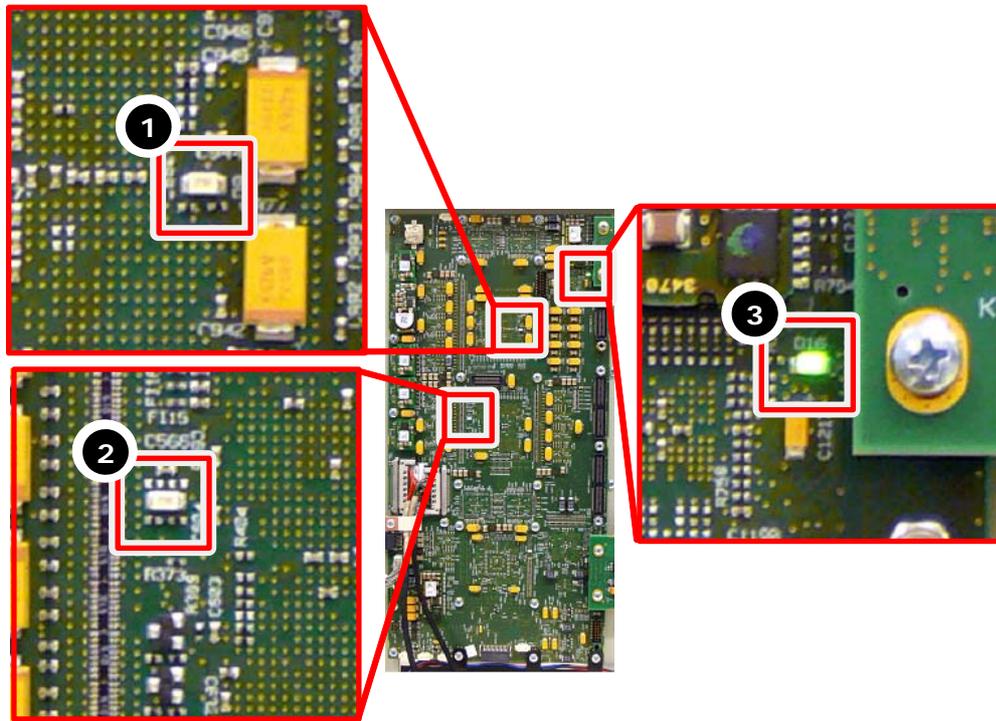
1	FPGA1 LED
2	FPGA2 LED
3	FREESCALE LED

Figure 8: IRIS board indicator LEDs

To verify if the IRIS board is defect, check the FPGA LEDs on the position n°1 and n°2. They light up orange after start-up and should go out when they are configured. When one of those FPGA indicator LEDs does not go out, the IRIS board is defect. The display unit should be send back to Barco.

The Freescale LED should light up green during operation. This LED is only for development purposes and will not be present on the new version of the IRIS board.

6.7   Light diagnostics

In case the display unit is switched on, but nothing is displayed on the screen, even after exhausting the "Nothing observed on the screen" fault finding tree in the User manual:

- Switch on the display unit. Check if the backlight switches on. (Even black should become brighter)

If the backlight does not switch on:

- Prepare the display unit for diagnostics:
    - ✓ Remove the power connection to the display unit
    - ✓ Remove back cover as described in "Removal and reinstallation back cover"
    - ✓ Do not disconnect any cables inside the display unit
    - ✓ Reapply or switch on the power connection to the display unit

- Check if LEDs D16 and D17 on the PIB are on. If not, replace PIB as described in "Removal and reinstallation of the Power Interface Board (PIB)"

- Check if the backlight is connected to the power (Connector J8 on PIB)

The fault is likely to originate in the IRIS board or the backlight board when:

- the backlight has power but is never switched on

- the backlight switches on but no menu or other picture can be made visible on the screen

The IRIS board can only be replaced by Barco qualified personnel. Send the display unit back to Barco.

6.8   Image diagnostics

In case the display unit shows the no valid sync message and the "Verify input signal" fault finding tree from the User manual does not resolve the problem:

- Source validation:
    - ✓ Check the video source on another input board or on another display unit
    - ✓ Check if a different video source applied to the same input of this display unit shows an image on the screen
    - ✓ Check whether your source is a validated input timing for your firmware version. (User manual)

- If the source is valid, try to resolve the problem by installing a new/different input board as described in " Removal and reinstallation of HDSDI board"

- If installing a new/different input board is unsuccessful, the IRIS board is the most likely to cause the problem. The IRIS board can only be replaced by Barco qualified personnel. Send the display unit back to Barco.

6.9   Communication diagnostics

In case there is no communication with the display unit, and the problem is not related to the network or the IP address, then the problem can be related to the communication board. Replace the communication board as described in "Removal and reinstallation of the communication board".

If installing a new communication board does not solve the issue, the IRIS board is the most likely cause of the problem. The IRIS board can only be replaced by Barco qualified personnel. Send the display unit back to Barco.

6.10   Color diagnostics

Each display unit is calibrated in the factory with the highest precision to the correct white point, primaries and gamma. Two main issues can cause color problems:

- Defects

- Matching between the display unit and other types of displays (e.g. CRT technology based display units)

Defects

Make a visual inspection of the displayed image. Check for the problems described below:

- One horizontal stripe of the display unit has a different color than the rest of the screen

- The whole image as an extreme color (such as purple, green, red, etc…)

If one of the problems described above occurs, follow the diagnostics procedure below:

- Restart the display unit

- If the problem persists or occurs frequently, try an update to the latest firmware

- If the above checks do not resolve the issue, the display unit will have to be serviced and/or send back to Barco.

Matching problems

If the display color resembles the needed color (e.g. compared to a CRT), but is slightly 'off' (white point slightly reddish, greenish, purplish etc) from the expected color, several settings can be checked to obtain a better matching. The points below describe the possible steps that can be taken to reach the desired color matching:

- Make sure the display is warmed up (wait at least 20 minutes)

- Press the CAL button and select the appropriate color space (e.g. Rec.709 for HD content, EBU 3213 for European SD content, SMPTE C for US SD content, etc…)

- Check in the color working space menu (x,y,L) if the white point, gamma and/or RGB primaries correspond to the standard values as specified in the User Manual

- The white point of the RHDM can still differ slightly with respect to another display unit (e.g. a reference CRT monitor). Try to manually adjust the white point of the display unit. Differences in white point can be related to:
  - ✓ different technologies
  - ✓ different calibration sensors
  - ✓ metameric difference of a human observer because of difference between LED and phosphor spectra

NOTE:

When the colors of the display unit seem 'greenish', decrease the y coordinate of the white point from 0.329 down to a value as low as 0.315 and increase the x coordinate of the white point from 0.3127 up to a value of 0.315.

IMPORTANT:

Do not measure the display unit with a colorimeter such as DK Technologies, Konica Minolta CA 210, Thoma, Klein K-10 etc. These probes will give erroneous results because the display unit is a LED-based display. The color filters do not match. It is recommended to use a spectrophotometer for reliable results.

NOTE:

The CRT can be measured with a corresponding probe (such as mentioned above). Use the obtained values to manually adjust the (x,y) coordinates of the display unit.

If the above checks do not resolve the color matching issue, contact Barco for further assistance. A display swap would probably not solve the problem as the problem is related to the difficulty in matching different technologies.

7 Removal and reinstallation of electronic boards

7.1 Service levels

Maintenance levels:

Level	Swap level	Description	Required level and/ or training
1	NONE	• User level – adjustments • User software uploads	User Product training
2	LRU	Technical Services: • Swap of electronic boards described in maintenance manual • Calibration of display unit	Product training Certified "customer personnel" or "partner"
3	LRU	Qualified regional service center: • Swap of electronic boards described in maintenance manual • Repair of electronics • Calibration of display unit	Repair training
4	LRU + SRU	Product base: • Swap of electronic boards described in maintenance manual • Repair of electronics • Calibration of display unit • Panel swap, optics and backlights repair • Iris board swap • Firmware uploads	Repair training

Table 1: Maintenance levels

The Maintenance manual may only be used by personnel with a level of 2 or higher.

7.2 Module replacements (level 2 and level 3)

The following boards can be replaced at an authorized service center:

- Power supply (B563073)
- Power Interface Board (K5831235)
- HDSDI Input Board (K5831223)
- DVI Input Board (K5831220)
- Communication Board (K5831234)
- Control Box (K5031237)

7.3 Module replacements (level 4)

- The Main (Iris) board (K5831238) cannot be replaced at a service center. When the Main (Iris) board is defect, the whole display unit should be send back to Barco for repair.

- The panel, the panel driver board and the LED driver board cannot be replaced at a service center. When a part of the front cover is defect, the whole display unit should be send back to Barco for repair.

7.4 Spare part kits (level 2 and level 3)

The following spare part kits can be ordered:

- RHDM Starter Spare kit – K5031254

    - ✓ RHDM Power Supply
    - ✓ RHDM Power Interface Board
    - ✓ RHDM HDSDI Input Board
    - ✓ RHDM Communication Board
    - ✓ RHDM Control box
    - ✓ RHDM Accessory kit

- RHDM Accessory kit – K5031253

    - ✓ Knobs
    - ✓ VESA screws
    - ✓ User manual

7.5 Removal and installation precautions

WARNING:

Always disconnect the unit from mains before removing covers and/or replacing boards!

CAUTION:

The units contain ESD sensitive subassemblies. Before commencing the removal/reinstallation procedure of modules and/or boards, place the unit on an ESD safe work mat, the back cover of the unit facing upwards.

Do not loosen any screws unless they are mentioned in the removal and reinstallation procedure

7.6 Required tools

- Screwdriver for torx head screws – T20

- Screwdriver for torx head screws – T10

- Screwdriver for torx head screws – T7

- Wrench – size 16

- Screwdriver for crossed head screws – type PH0

7.7   Remove the brackets

The display unit is delivered with brackets for rack mounting.
First remove the 2 rack brackets with handles by unscrewing (2x) 3 torx head screws T20.
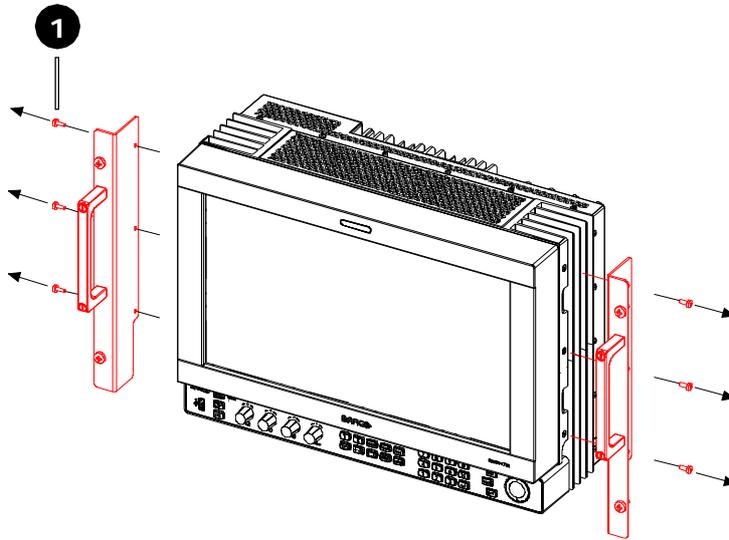
Figure 9: Removal of rack brackets

7.8   Removal and reinstallation back cover

Removal of the back cover

IMPORTANT:

Removing the back cover voids the warranty.

- •   Use a flat and stable table to handle the display unit

- •   Cover the surface of the table with bubble wrap or a similar protective material to avoid scratching of the LCD panel.

- •   Place the display with the LCD panel (front) facing down and the top of the display unit away from the edge of the table. You should be positioned at the bottom side of the display unit to be able to remove the back cover easily.
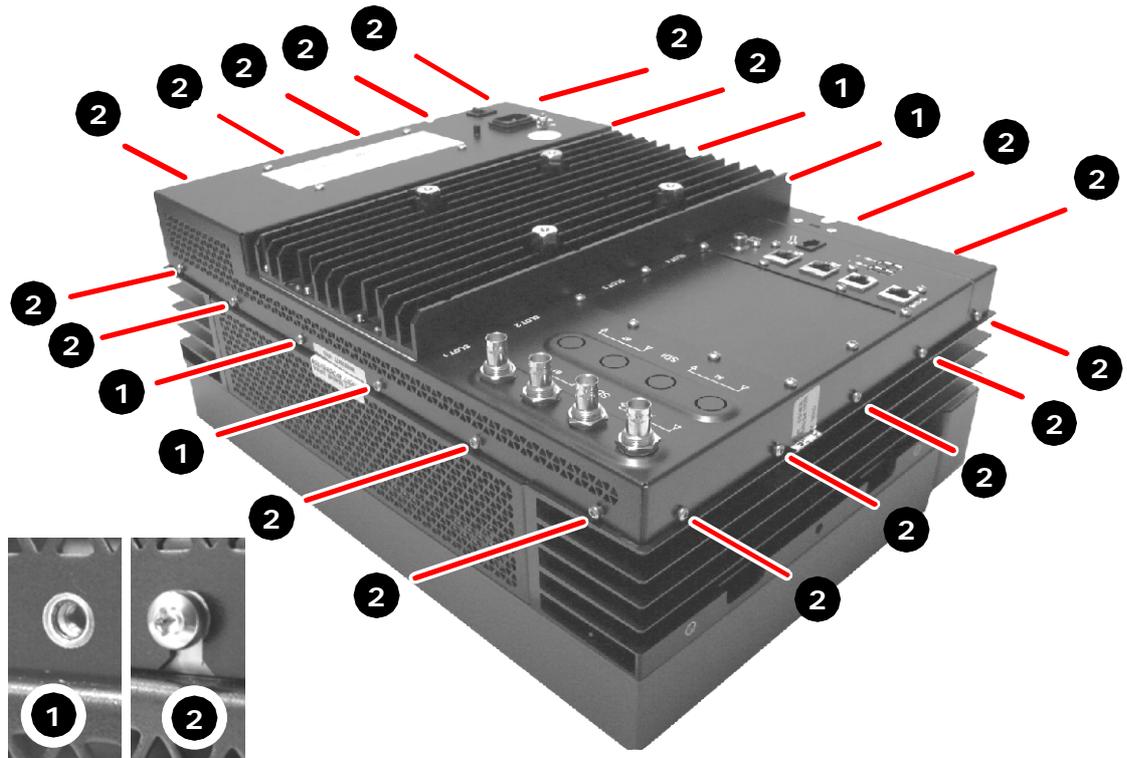
| 1 | Screws (4x) - remove completely |
| 2 | Screws (18x) - loosen only |

Figure 10: Location of the screws that fix the back cover to the front cover

- The back cover is fixed to the front cover with 22 screws in total. Use a T10 torx screwdriver to loosen the screws. The screws of type 1 (see figure above) must be removed completely, while the screws of type 2 should be loosened only.

- To remove the back cover, do not force anything. Do not pull-off the back cover completely, since several wires are connecting the electronic boards in the back cover to electronic boards in the front cover. Lift-up the cover by pulling at all sides evenly. When the back cover has lost contact with the front cover, put the bottom side of the back cover on the edge of the front as in figure below. Watch out that the back cover does not fall.
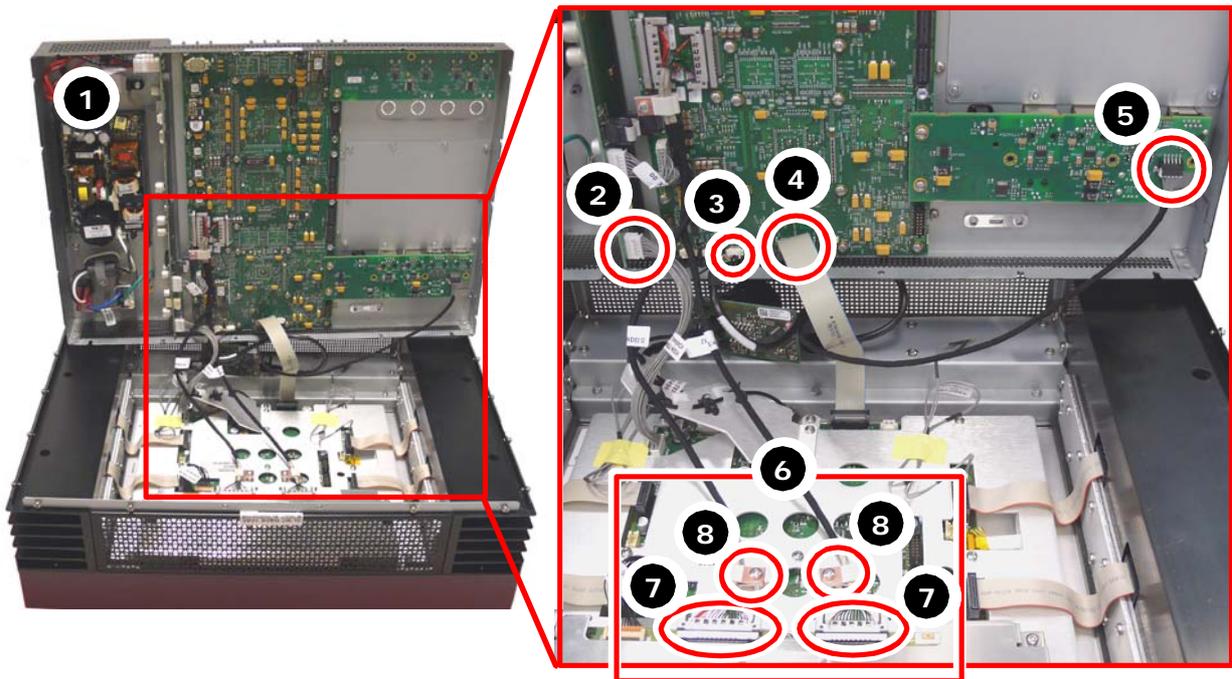
1	Open cover from the top
2	J8 - Power connection to LED driver board (J1)
3	J7 - USB connection to control box
4	J11 - flat cable from Iris board to LED driver board (J8)
5	J11 - Communication board connector to control box
6	LVDS cable connection area on the panel driver board
7	LVDS cable connection to panel driver board
8	Screws (2x) that fix the LVDS cables to the LED driver board

Figure 11: Location of cables that connect the electronic boards in the back cover with the electronic boards in the front cover.

- Remove the cables that connect the electronic boards in the back cover to the electronic boards in the front cover
  - ✓ Disconnect the cable of the power interface board connected to the LED driver board (n°2 in the figure above)
  - ✓ Disconnect the cable of the main (Iris) board connected to the control box (n°3 in the figure above)
  - ✓ Disconnect the flat cable of the main (Iris) board connected to the LED driver board (n°4 in the figure above)
  - ✓ Disconnect the cable of the I/O board connector J11 connected to the control box (n°5 in the figure above)
  - ✓ Disconnect the LVDS cables (2x) of the main (Iris) board connected to the panel driver board (n°7 in the figure above).
  - ✓ Remove the clamps (2x) that fix the LVDS cables (n°8 in the figure above).

- The back cover is now disconnected and is ready for further maintenance actions.

Reinstallation of the back cover

Execute all actions mentioned above in the reverse order.

Take the following points into account:

- After connecting the LVDS cables to the panel driver board, verify that the clamps are placed over the stripped part of the LVDS cables.
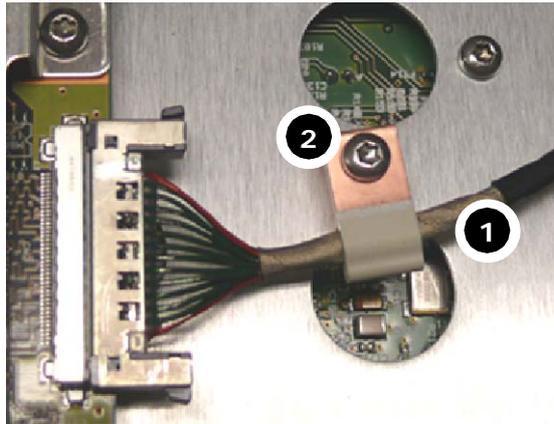
| 1 | Stripped part of LVDS cable |
| 2 | Copper clamp fixation |

Figure 12: Correct clamping of the LVDS cables

7.9   Removal and reinstallation of the power supply

Figure 13: Top view of the power supply

Removal of the power supply

- Follow the removal instructions of the back cover to remove the back cover.

- Place the back cover on the table with the inside facing up.
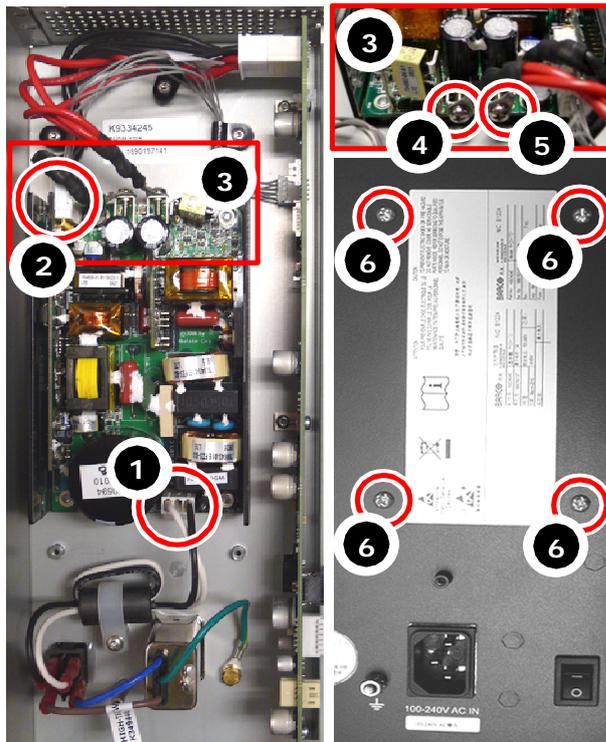
1	J1 - Input AC power from AC input at the back
2	J204 - Output to PIB
3	J3 - Connection area J14 and J15 to the PIB
4	J14 - (+) Output to the PIB (red wire)
5	J15 - (-) Output to the PIB (black wire)
6	Screws (4x) that fix the power supply to the back cover

Figure 14: Location of screws and connectors of the power supply

- Place the back cover upright

- Remove the crossed head screws (4x) located at the backside of the back cover (n°6 in the figure above).

- Disconnect the cables connected to the power supply:
  - ✓ Cable from the AC input connector, connected to J1 (n°1 in the figure above)
  - ✓ Cable to the power interface board, connected to J204 (n°2 in the figure above)
  - ✓ Unscrew the red cable (J14) to the power interface board (n°4 in the figure above)
  - ✓ Unscrew the black cable (J15) to the power interface board (n°5 in the figure above)

Reinstallation of the power supply

- Execute all actions described above in reverse order. It is convenient to connect the cables to the power supply before fixing the power supply to the back cover.

7.10 Removal and reinstallation of the power interface board
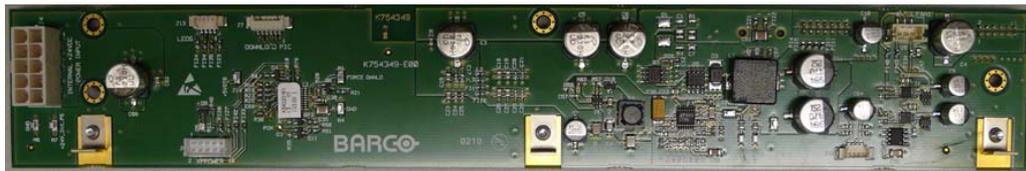
Figure 15: Front view of the Power Interface Board

The Power Interface Board contains indicator LEDs that provide valuable information about the status of the power distribution to the display unit.
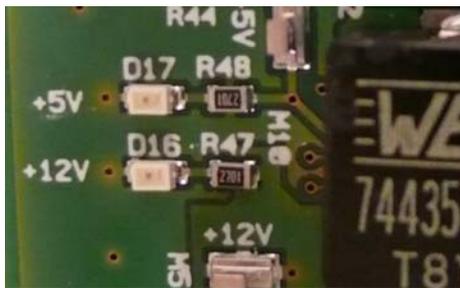
Figure 16: Indicator LEDs on the Power Interface Board

- D16 – 12 V power supply: power conversion check
- D17 – 5 V power supply: power conversion check

Removal of the Power Interface Board

- Follow the removal instructions of the back cover to remove the back cover.
- Place the back cover on the table with inside facing up.
- Remove the screws (3x) that connect the power board to the back cover (n°1 in the figure below)
- Disconnect the cables on the power board:
  - ✓ From power supply to J4 on PIB (n°2 in the figure below)
  - ✓ From power supply to J6 on PIB (n°3 in the figure below)
  - ✓ From J9 on PIB (n°4 in the figure below) to Iris board
  - ✓ From J10 on PIB (n°5 in the figure below) to Iris board
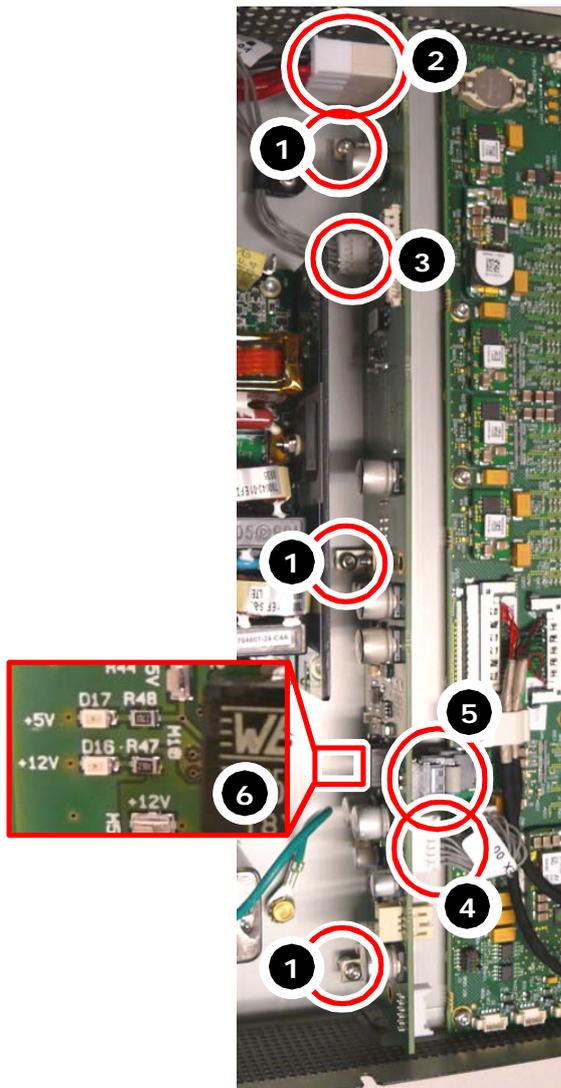
1	Screws (3x) that fix PIB to the back cover
2	J4 - 24 Vdc input to PIB from AC power supply
3	J6 - XPPower
4	J9 - Power to Iris board
5	J10 - Communication to Iris board
6	LED indicators on the PIB

Figure 17: Location of screws, cables and indicator LEDs on the Power Interface Board

Reinstallation of the Power Interface Board

Execute all actions described above in reverse order.

7.11   Removal and reinstallation of HDSDI board

Removal of HDSDI input board
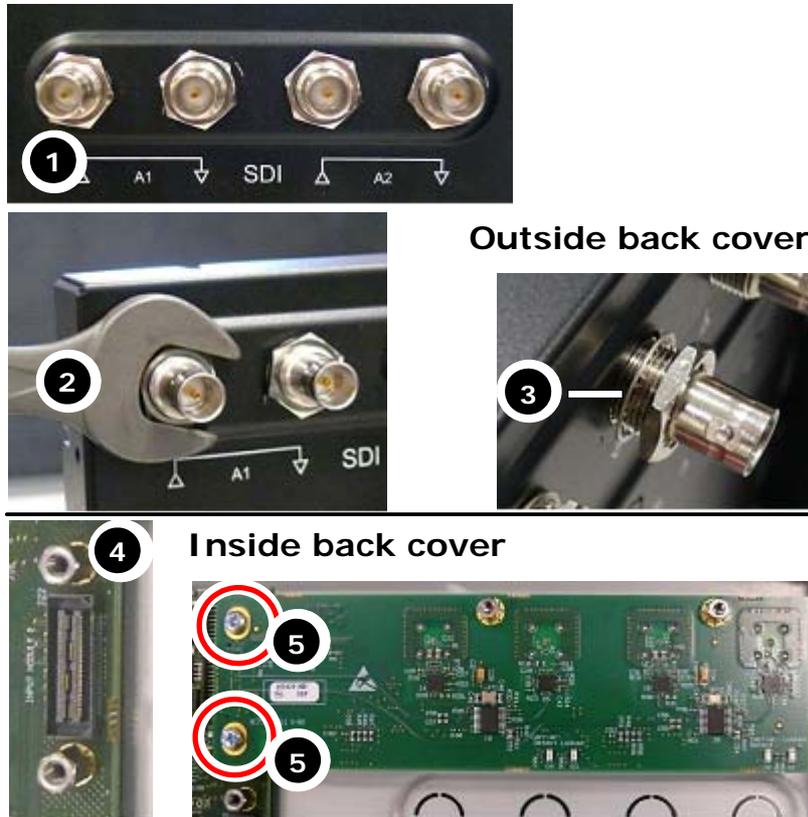
1	Connectors on the HDSDI input board - back cover
2	Loosen or tighten the nuts (4x) with a size 16 wrench
3	Location of the crincle washer at the HDSDI input connectors
4	Connector socket for HDSDI board on Iris board
5	Screws (2x) that fix the HDSDI board to the Iris board

Figure 18: Location of screws to remove/mount the HDSDI input board

- Follow the removal instructions of the back cover to remove the back cover.
- Place the back cover upright.
- Unscrew and remove the nuts (4x) at the outside of the back cover with a wrench (n°2 in the figure above).
- Place the back cover on the table with the inside facing up.
- Remove the screws (2x) that fix the HDSDI input board to the main (Iris) board (n°5 in the figure above).
- Pull the HDSDI board gently from the slot.

Reinstallation of HDSDI input board

Execute all actions described above in reverse order.

Take the following points into account:

- Before fixing the HDSDI board to the back cover with the nuts, verify that at all the BNC connectors, the crinkle washer is placed between the back cover and the nut (n°3 in the figure above).

7.12 Removal and reinstallation of the communication board

Removal of the communication board

1	Torx (3x T10) that fix the communication board to the back cover
2	Torx (1x T7) screw that fixes the communication board to the back cover
3	Metal housing of USB connectors
4	Connector socket for communication board on Iris board
5	Screws that fix the communication board to the Iris board
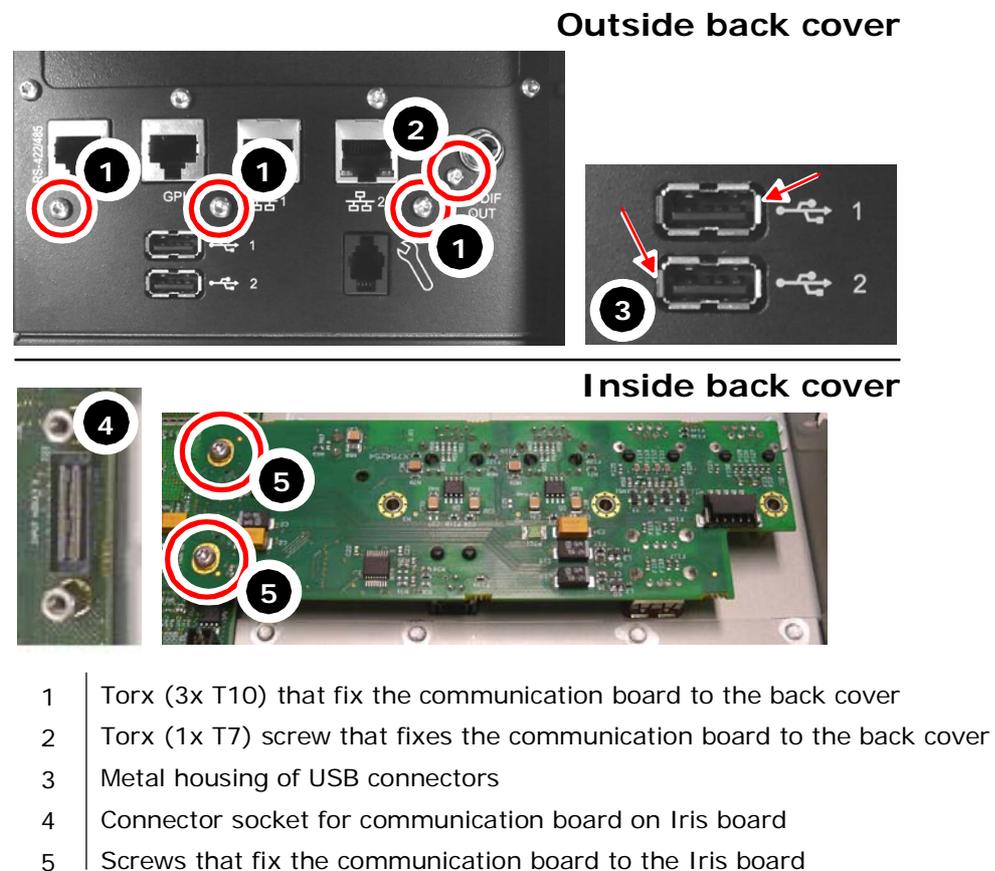
Figure 19: Location of screws to replace the communication board

- Follow the removal instructions of the back cover to remove the back cover.
- Place the back cover on the table with the outside facing up.
- Remove the screws (4 in total) (n°1 torx T10 and n°2 torx T7, in the figure above) that fix the communication board to the back cover.
- Flip-over the back cover and remove the screws (2x) that fix the communication board to the main (Iris) board (n°5 in the figure above).
- Pull the communication board gently out of the socket.

Reinstallation of the communication board

Execute all actions described above in reverse order.

Take the following points into account:

• When placing the communication board in the back cover, verify that the metal housing of the USB ports is nicely fitting in the holes (n°3 in the figure above).

7.13   Removal and reinstallation of the control box

Figure 20: Control box
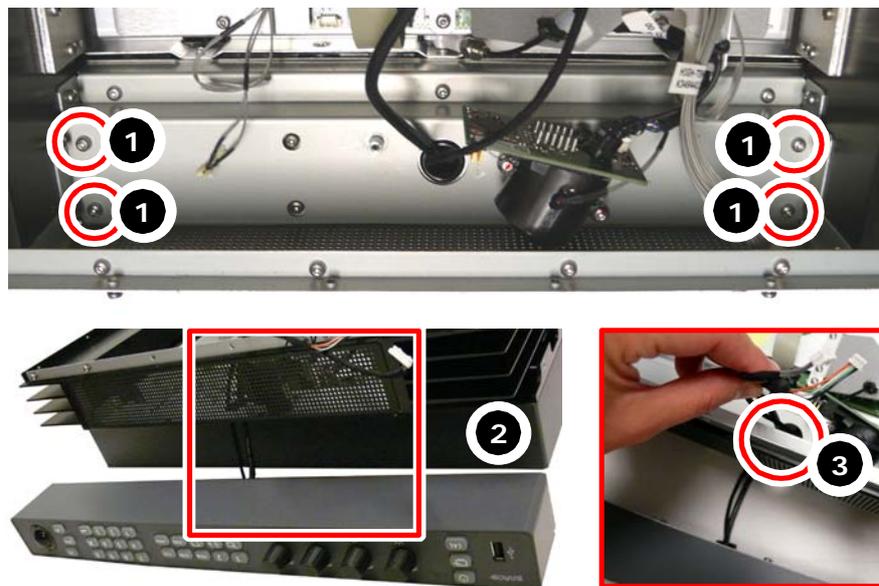
1	Torx (4x T10) that fix the control box to the front cover
2	Control panel removed from the front cover
3	Cable gap in front cover for control panel cables

Figure 21: Location of screws, cables to remove or install the control box

Removal of the control box:

- Follow the removal instructions of the back cover to remove the back cover.

- Place the front cover on the table with the inside facing upwards.

- Remove the control box by unscrewing 4 screws that fix the control panel to the bottom of the display unit (n°1 in the figure above).

- Slide the cables through the cable gap (n°3 on the figure above), so that the control box can be completely removed.

Reinstallation of the control box:

Execute all actions described above in reverse order.

Take the following points into account:

- To fasten the control box to the cover. First place the 4 fixation screws in the front cover and then locate the box on the front so that the screws fit in the foreseen holes in the control box. Fasten the screws one by one.

8 Interconnections
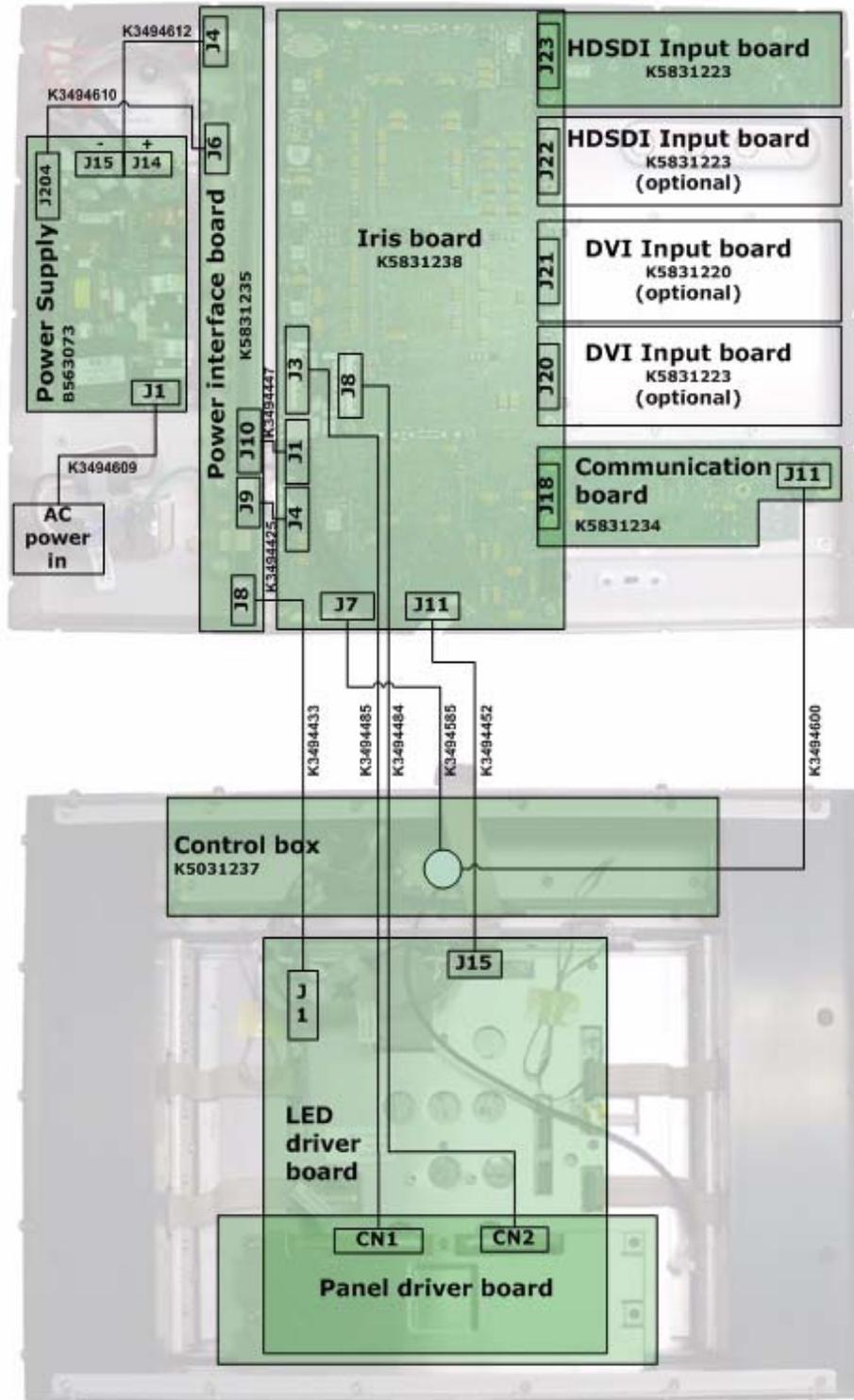
Figure 22: Interconnection drawing

9   Adjustments

No specific adjustments are needed after replacement or reinstallation of a new module.

It is recommended to update the software of the display unit to the newest version after replacement of new electronic modules.

The IRIS board and the front cover of the display unit are the only parts that need adjustment. Those parts have to be send back to Barco and will be recalibrated and updated where needed in the factory.

10 Maintenance

10.1 Cleaning precautions

- Take care not to damage or scratch the LCD surface. Be carefull with rings, jewellery and rough materials. Handle the LCD with care to avoid scratches.

- Do not apply pressure on the LCD surface.

- Do not apply or spray liquid directly to the LCD surface or cover as excess liquid may cause damage to internal electronics. Instead apply the liquid to the cleaning cloth.

- Avoid dirt of fingerprints, oil, and fat staining on the LCD surface as they will harm the LCD. Remove dirt by following the cleaning instructions below.

10.2 Cleaning instructions (for CIVIL)

Before cleaning:
- Switch off the display unit.
- Remove the power cord from the mains.

Cleaning the LCD screen:
- Wipe the screen surface with a soft cleaning cloth.
- To remove stains, use a damp cloth with non-aggressive cleaning products:
  - ✓ Do NOT use abrasive cleaning agents, glass cleaner or tissue paper.
  - ✓ Do NOT use alcohol/solvents at higher concentration > 5%.
  - ✓ Use non-aggressive cleaning products (water or a solution of distilled water and IsoPropyl Alcohol).
- Do not rub or push on the LCD screen. Rubbing with tissue can degrade the performance of the LCD screen.

Cleaning the cover:
- Use a soft cloth to remove dust. If necessary, a vacuum cleaner can be used to clean the ventilation openings (if applicable).
- Use a damp cloth (if necessary with some mild detergent) to remove stains.
- Do not use a scouring pad, or other tools that my scratch and damage the cover.
- Do not use strong detergents such as alcohol and thinner.

11   Abbreviations and acronyms

°C	Degrees Celsius
°F	Degrees Fahrenheit

A

ActEv	Actions + Events (name of a Barco software product)
AGC	Automatic Gain Control
ALC	Automatic Light Control
AMLCD	Active Matrix Liquid Crystal Display
ANSI	American National Standards Institute
APA	Automatic Phase Adjustment
AR	Anti Reflective
a-Si TFT	Amorphous Silicone Thin-Film Transistor
AWG	American Wire Gauge

B

BARCO	Belgian-American Radio Corporation
BCM	Barco wall Control Manager

C

CAN	Controller Area Network
CCFL	Cold Cathode Fluorescent Lamp
CCIR	Consulting Committee International
cd	candela
CE	Conducted Emissions, Conformity European (safety)
CIE	Commission International de l'Éclairage (Illumination)
CM	Console Mount
cm	centimeter
CMS	Control room Management Software
CoG	Combined sync on Green
CR	Contrast Ratio
CS	Combined Sync
CS	Conducted Susceptibility
CVBS	Composite Video Blanking Sync

D

DAC	Digital to Analog Converter
DC	Direct Current
DDC	Display Data Channel

DM	Display Module
E	
EBU	European Broadcast Union
EDID	Extended Display Identification Data
EIA	Electronic Industries Association
EMI / EMC	Electromagnetic Interference / Electromagnetic Compatibility
EN	European Norms
EOTF	Electro Optical Transfer Function
ESD	Electrostatic Discharge
F	
FD	Full Duplex
FLIR	Forward Looking Infrared
FPDM	Flat Panel Display Measurements
G	
GPI	General Purpose Interface
H	
HD	Half Duplex
HDMI	High Definition Multimedia Interface
HDSDI	High Definition Serial Digital Interface
HE	Highly Efficient
HEA	High Efficiency Antireflective
HID	Human Interface Device
HMI	Human-Machine Interface
I	
ICD	Interface Control Document
IEC	International Electrotechnical Commission
IP	Ingress Protection
ISO	International Standard Organization
ITO	Indium Tin Oxide
ITU	International Telecommunications Union
K	
kg	kilogram
L	
L	Luminance
LCD	Liquid Crystal Display
LFC	LCD Flicker Compensation
LRU	Line Replaceable Unit

LUT	Look Up Table
Lux	Measure of illumination (lumens per meter squared)

M

mm	millimeter
ms	milliseconds
MTBF	Mean-Time-Between-Failures
MTTR	Mean-Time-To-Repair

N

NEMA	National Electronics Manufacturers Association
NSL	Near Seamless LCD
NTSC	National Television Systems Committee

O

OSD	On-Screen Display

P

PAL	Phase Alternating Lines
ppi	pixels per inch
PVA	Patterned Vertical Alignment
PVC	polyvinyl chloride

R

RE	Radiated Emissions
RFU	Reserved for Future Use
RGB	Red, Green, Blue (letters/colors also referenced separately)
RH	Relative Humidity
RHDM	Reference High Definition Monitor
RM	Rack Mount
ROT	Rotator
RoHS	Restrictions of Hazardous Substances
RS	Radiated Susceptibility

S

SDI	Serial Digital Interface
SDSDI	Standard Definition Serial Digital Interface
SG	Symbol Generator
SMPTE	Society of Motion Picture and Television Engineers
SS	Separate Sync
STANAG	Standardization Agreement
SVGA	Super Video Graphics Array
SXGA	Super eXtended Graphics Array

T

TBC	To Be Confirmed
TBD	To Be Defined
TBM	To be Measured
TBT	To Be Tested
TTL	Transistor Transistor Logic
U	
UMD	Under Monitor Display
V	
VDC	Volts Direct Current
VESA	Video Electronics Standards Association
VM	VESA Mount
W	
W	Watt

12 Table of contents

12.1   List of figures

12.2   List of tables

End of document